GLAST Balloon Flight Analysis VRVS Meeting - March 15, 2001

Purposes of this Meeting

Think about what we want to get out of the BFEM analysis (Identify our goals)

Outline the overall process involved in the analysis ("Analysis roadmap")

Define roles and responsibilities for the work ("Who's who")

Look for areas that need immediate attention (Action Items)

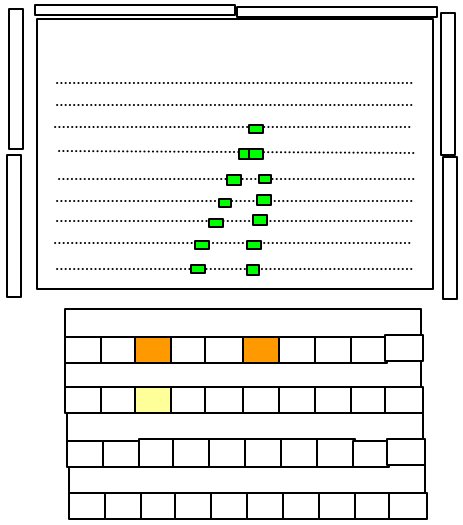
Start a list of tasks in order to prepare for analysis (Checklist)

Analysis Goals of the GLAST BFEM Balloon Flight

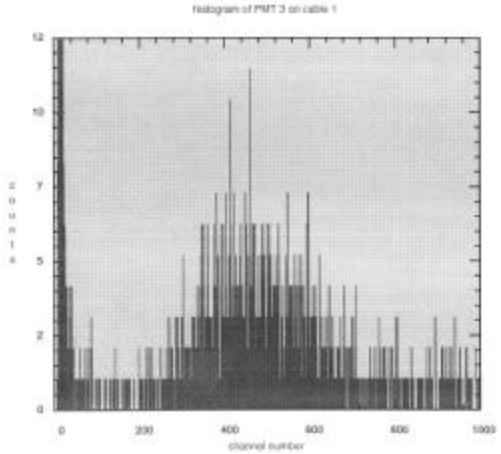
1. **Demonstrate that we can find gamma rays in flight data from a GLAST tower, i.e show that event reconstruction works. <u>This one is absolutely essential.</u>**
2. **Demonstrate that the XGT-tagged events match the GEANT4 simulation - flux, energies, directions**
3. **Re-confirm previous atmospheric gamma-ray measurements - flux, energy spectrum, zenith angle distribution.**
4. **Verify efficiency of proposed L2T and L3T algorithms.**
5. Others?

Example: What We Would Like to Have to Show to the PDR/Baseline Review - Goal 1

Event Display with an obvious pair event visible in tracker and calorimeter. Event selected by reconstruction/screening as tested in the Monte Carlo simulations.



ACD pulse height spectrum showing MIP separation from noise, based on straight tracks in the tracker.



Also: occupancy information for tracker; energy resolution from calorimeter for MIPs (?); rates for ACD top and side tiles, L1T, and reconstructed photon events (if possible), as a function of altitude; ACD-TKR-CAL matching efficiencies; anything else to demonstrate that we have a working system in flight. **NEEDED: A LIST OF SUCH ITEMS**.

ALSO, SIMILAR LISTS NEEDED FOR EACH OF THE OTHER GOALS.

BFEM Analysis Roadmap - From Raw Bits to Scientific Results

Level 0 - Interpreting the bits - geometry and detector response

GEANT4 simulation

Detector geometry and materials H

Expected signals from incident radiation - data format/file structure, event display.

Validation - verify geometry H, data definitions H

BFEM Instrument

Detector geometry H

Data stream definition/ data format /file structure, event display H

Level 1 - Data Storage, Integrity, and Manipulation - data processing on raw ROOT files

Runs definition - by incident radiation type, distribution, trigger mode H

Database of runs

Performance data - histograms, rates, triggering, etc.

Event reconstruction

Validation - compare tracks, efficiencies of subsystems, alignment

Runs definition - by BFEM trigger mode, time

Database of runs

Performance data - histograms, rates, livetime, triggering, scaling, offsets, etc. H

Event reconstruction

Level 2 - Extraction of Instrument Response and Science Data - from reconstructed ROOT files

Screening/filters/cuts of event types (particles, photons, XGT tagged, unknown, etc.) H

Derive response functions H

Validation - compare efficiency of same screening in selecting event classes

Screening/filters/cuts of event types (particles, photons, XGT tagged, unknown, etc.) H

Produce identified-event data base H

---------- This is where the derived instrument parameters and flight data are turned over to the users ----------

Level 3 - Scientific Results

Response functions for different types of incident radiation H

e.g. Effective area, PSF, DE/E vs. angle, energy, trigger mode for photons

Calibration - use model to convert observed data to results

Flux, energies, tags, angular distribution of various types of radiation H

H - **some areas where better definition is needed**

Who's Who in the GLAST BFEM Analysis World

Analysis Coordinator ("Czar") - Dave Thompson

Analysis Consultant - Eduardo do Couto e Silva

Definitions

Geometry - Tsunefumi Mizuno, Gary Godfrey

Data Format - JJ Russell

Data Validation - Dave Lauben, Scott Williams

Simulations

Tune Kamae

Takanobu Handa

Tsunefumi Mizuno

Patric Valtersson

Martin Sjogren

Sei Ogata

Hirofumi Mizushima

XGT Analysis

Tune Kamae

others?

Subsystem Performance

ACD - Alex Moiseev

Tracker - Wilko Kroeger

Calorimeter - Eric Grove

XGT - Tsunefumi Mizuno

BIU - Michael Lovellette

GSE - Dave Lauben, Scott Williams

On-board Software

JJ Russell

Tony Waite

Dan Wood

Bob Schaefer

Atmospheric Analysis

Dave Thompson, Dave Lauben, Dave Wren

Data Management and Integrity

Karl Young, Karen Heidenreich

Analysis Software Development

Lead - Richard Dubois

Data packaging - Heather Kelly

ROOT classes – Heather Kelly?

Event reconstruction – Tracy Usher, Leon Rochester.

Doc – Thomas Lindner, Alicia Kavelaars

Event cuts, screening, identification ??

Trigger Algorithm Analysis

What Needs Attention Now?

- Set up a balloon analysis Web page as a central location for information.
- Spell out PDR report goals in more detail.
- Define other analysis goals in more detail.
- Define and document BFEM and GEANT4 geometry, making sure they are consistent.
- Define and document BFEM and GEANT4 data formats, making sure they are consistent with each other and accurately represent the instrument. Identify responsibility for verification.
- Document ROOT classes and related information. Example: http://www-sldnt.slac.stanford.edu/glast/testbeam/Root-Info.htm
- Define needed response functions and required accuracy.
- Outline plans for BFEM event reconstruction and screening.